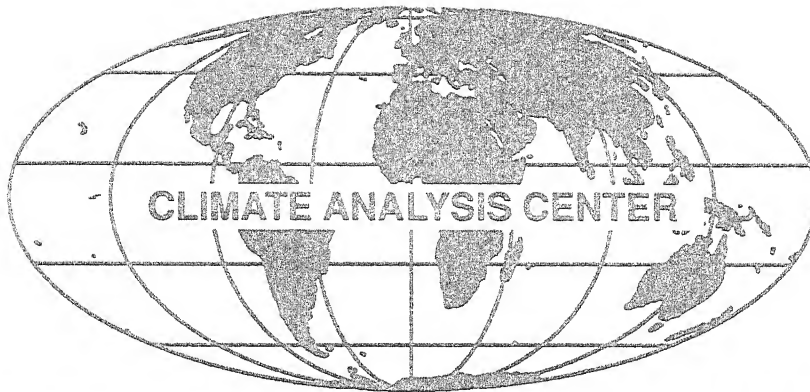


CONTAINS:

**JUNE 1993
UNITED
STATES
CLIMATE
SUMMARY**



WEEKLY CLIMATE BULLETIN

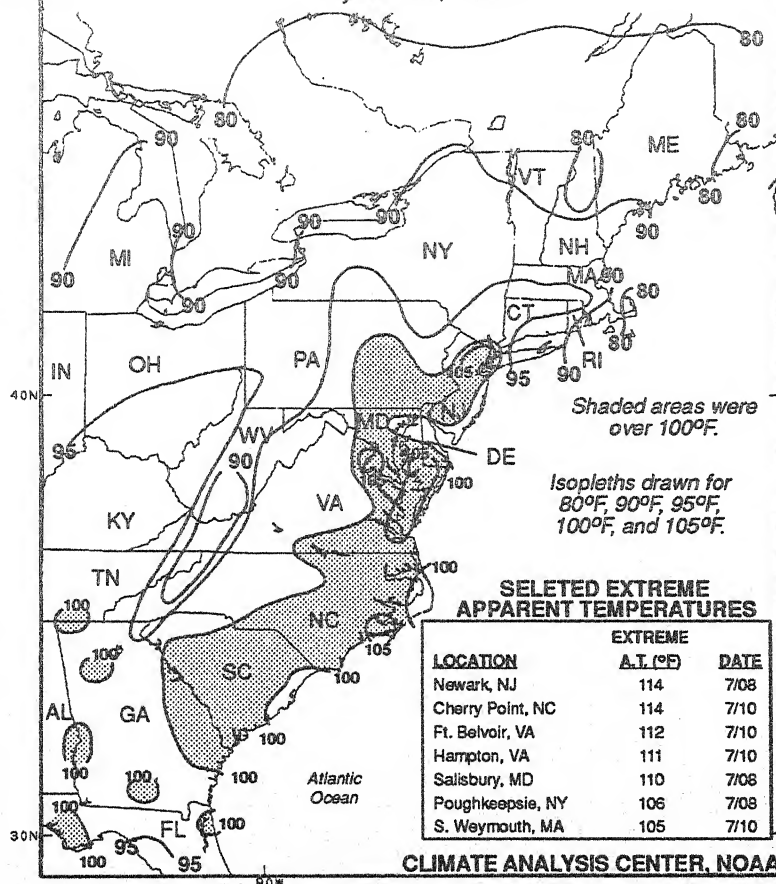
No. 93/28

Washington, DC

July 14, 1993

AVERAGE DAILY MAXIMUM APPARENT TEMPERATURE (°F)

July 4 - 10, 1993



STIFLING HEAT AND HUMIDITY COVER THE EASTERN SEABOARD. *The combination of heat and humidity generated average daily maximum apparent temperatures above 100°F along a large portion of the Atlantic Coast (see page 14 for an explanation of apparent temperature). Extreme apparent temperatures reached as high as 114°F on Thursday at Newark, NJ, and on Saturday at Cherry Point, NC. Actual temperatures exceeding 100°F were observed as far north as Rhode Island and eastern Massachusetts, with readings reaching 105°F in Newark and 103°F in central South Carolina. Daily highs AVERAGED 100°F for the week in central South Carolina and northeastern Georgia, but the week's largest departures from normal (+10°F to +12°F) were observed in southeastern Maryland, southern and eastern New Jersey, northern and eastern Pennsylvania, southern and western New York, and southern sections of New Hampshire and Maine. According to press reports, at least 48 individuals lost their lives as a result of the heat wave, most of whom were elderly people living in upper-floor apartments without air conditioning. A heavy demand for electrical power resulted from the heat wave, causing sporadic, isolated power outages on Friday and Saturday. Furthermore, press reports indicate that water pressure in the New York City area dropped to dangerously low levels as a result of water hydrants being uncapped.*



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER



GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JULY 10, 1993

1. Northwestern United States and Southwestern Canada:

UNUSUALLY COOL WEATHER.

Temperatures averaged as much as 7°C below normal across much of the Pacific Northwest and the northern Rockies. Minimum temperatures dipped below freezing at some Wyoming locations [2 weeks].

2. North-Central United States:

HEAVY RAINS CONTINUE.

Up to 275 mm of rain drenched parts of the region (especially southern and central Iowa) as six-week moisture surpluses rose to 300 mm at some locations. According to press reports, rising flood waters knocked out the water supply system in Des Moines, IA and inundated farmland along the Mississippi River [21 weeks].

3. Eastern United States and Southern Ontario:

HEAT WAVE AGGRAVATES DRYNESS.

Temperatures averaged as much as 7°C above normal, with highs reaching 39°C in Georgia and the Carolinas (see front cover) [2 weeks]. The hot weather aggravated the abnormally dry conditions in the Southeast and the mid-Atlantic. Last week, less than 30 mm of precipitation fell on most areas, although isolated showers dropped up to 70 mm on parts of Georgia and South Carolina. Six-week moisture deficits reached 150 mm in parts of Georgia and the Carolinas and 250 mm in central Florida [11 weeks].

4. Central Mexico:

HURRICANE CALVIN STRIKES MEXICO.

Torrential downpours dumped as much as 350 mm of rain on already-saturated parts of south-central Mexico as Hurricane Calvin affected the region (see page 4) [3 weeks].

5. Southern Europe:

STILL UNUSUALLY DRY.

Although up to 40 mm of rain fell on parts of Romania, most areas received less than 20 mm, allowing six-week moisture deficits to remain in the 50 to 100 mm range [13 weeks].

6. Southwestern Asia:

WET WEATHER PERSISTS.

As much as 70 mm of rain fell on some locations as six-week moisture surpluses approached 100 mm in a few areas. According to press reports, heavy rains caused flooding in parts of Iran and Afghanistan [10 weeks].

7. Northwestern India:

MONSOON RAINS CAUSE FLOODING.

Heavy rains (up to 300 mm) associated with an active monsoon inundated much of the region. According to press reports, resultant flooding claimed over 100 lives and caused considerable crop and property damage [4 weeks].

8. Southeastern China:

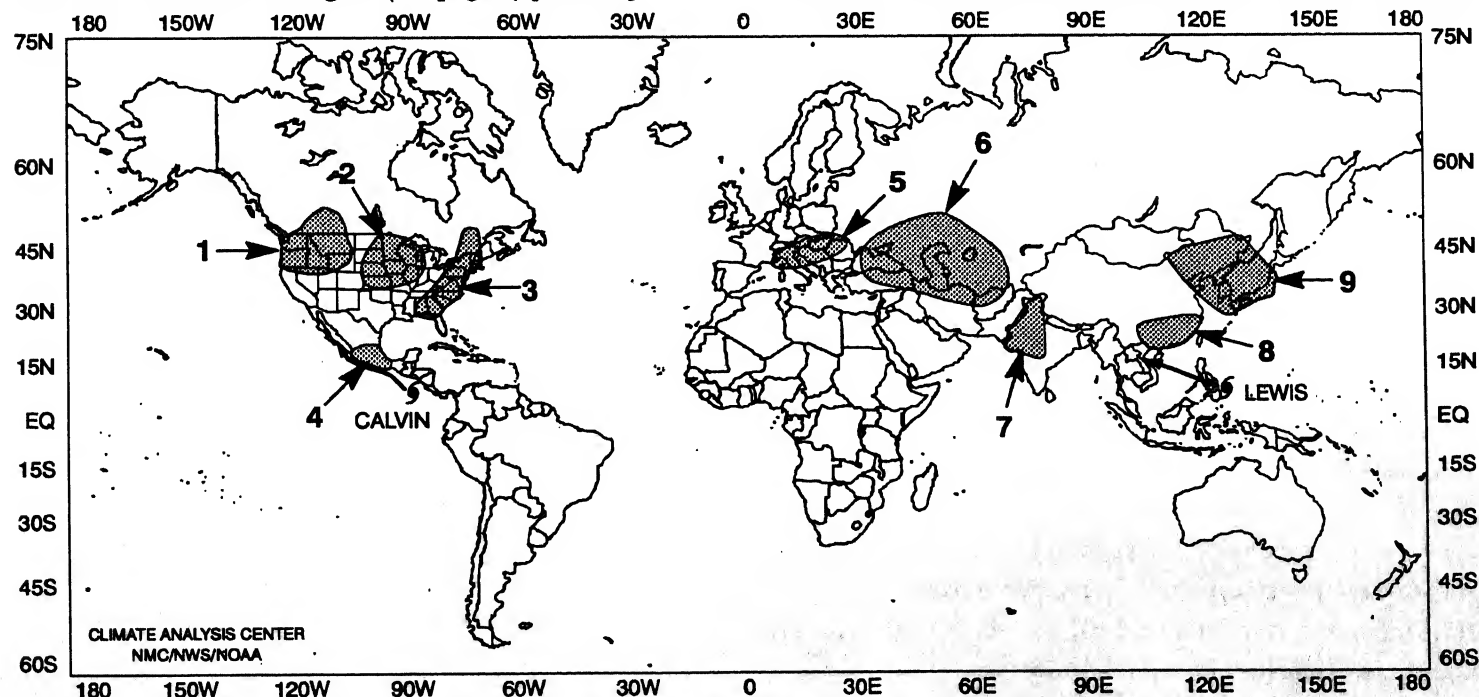
TORRENTIAL RAINS CONTINUE.

According to press reports, more than 80 lives were lost and almost a quarter million homes were destroyed as up to 270 mm of rain fell on the Yangtze River Valley. Drier conditions, however, were reported to the south and east of the Yangtze River Valley. [13 weeks].

9. Korea, Japan, and Northeastern China:

STILL VERY WET.

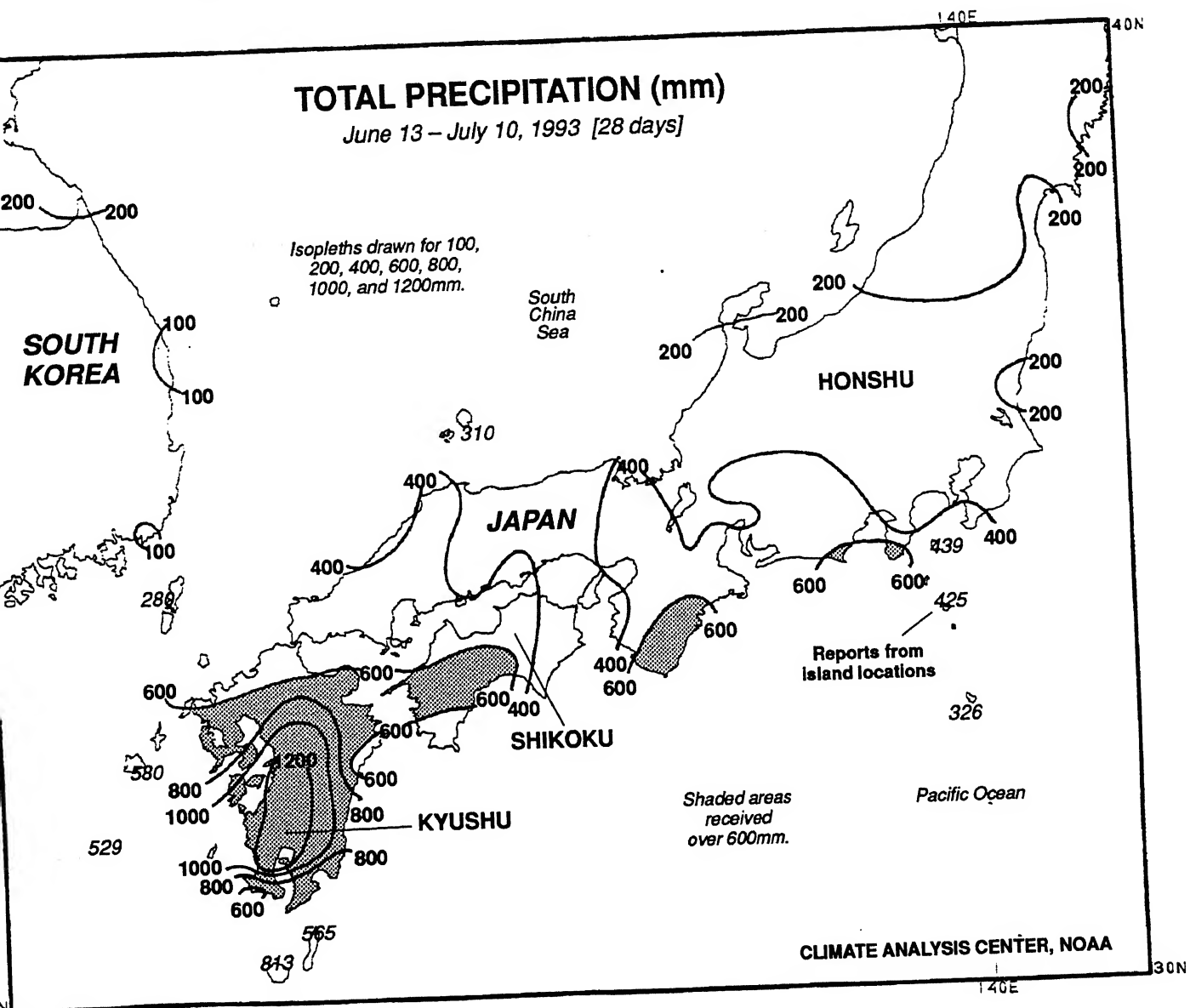
More heavy rains soaked the region, with totals approaching 220 mm in northeastern China and 330 mm in Japan. Six-week rainfall surpluses remained near 200 mm in Korea but climbed to 700 mm in parts of southwestern Japan [13 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.
MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

GLOBAL CLIMATE HIGHLIGHTS FEATURE



INUNDATING RAINS CONTINUE TO SOAK SOUTHWESTERN JAPAN. Heavy rains and resultant flooding across the central United States, Mexico, northern India, and southeastern China have dominated recent weather-related news, but exceptionally heavy rains have also been observed through southwestern Japan since mid-June. During the 28-day period June 13 – July 10, up to 1280 mm of rain were measured in southwestern Kyushu – an average of over 45 mm per day. The observed totals represent 2.5 to 3.5 times the normal amount in portions of southwestern Honshu near Osaka Bay, across northern and western Shikoku, and through much of Kyushu. Accumulated surpluses over 100 mm were widespread from central Honshu southwestward through the remainder of the Archipelago, with 500–905 mm more than normal rainfall reported in parts of southeastern, central, and west-central Kyushu. Last week, 100–360 mm of rain fell across south-central and southwestern Honshu, central and southern Shikoku, and most of Kyushu, with daily totals reaching 235 mm.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JULY 4 – 10, 1993

Incessant and heavy rains of up to twelve inches continued to inundate much of the east-central Plains and upper and middle Mississippi Valley, aggravating major flooding along most rivers and streams in the region. The depth of the Mississippi at St. Louis, MO was projected to crest near 45 feet by the middle of next week, surpassing the current record of 43.3 feet set in 1973. The Corps of Engineers said almost all levees between Hannibal, MO and St. Louis were breached, although St. Louis was expected to remain dry behind their high flood wall. Numerous levees along the lower Missouri River were also breached, according to press reports. The record flooding has forced more than 30,000 people from their homes and caused 18 deaths since late June. Officials estimate crop and property damage at more than \$2 billion in South Dakota, Minnesota, Wisconsin, Nebraska, Iowa, Illinois, and Missouri. Rising flood waters along the Des Moines and Raccoon Rivers swamped central Iowa, knocking out a water treatment plant serving about 250,000 people in Des Moines as well as seven electric substations, leaving many residents without power or water. As the week ended, several hundred more people in south St. Louis were asked to leave their homes as the River Des Peres continued to rise. Amtrak canceled service between Chicago, IL and Denver, CO and between Chicago and Kansas City, MO, because of the floods, according to press reports.

Meanwhile, the eastern fourth of the nation sizzled as temperatures reached into the upper nineties and above. Many cities along the Atlantic coast, including New York city, Washington, DC, and Philadelphia, PA, surpassed 100°F during the latter part of the week. The combination of heat and humidity produced apparent temperatures exceeding 105°F along the Atlantic coast from South Carolina to New York. Forty eight people (primarily elderly individuals without air conditioning) died from the excessive heat.

The week began with a strong frontal system generating showers and thunderstorms from the northern Rockies eastward to the upper Great Lakes and southeastward to the east-central Plains and middle Mississippi Valley. Severe thunderstorms, accompanied with high wind, large hail, and heavy rain, swept across eastern Kansas and southern Iowa. On Tuesday, torrential rains drenched the lower Missouri Valley while showers and thunderstorms were scattered over the lower Great Lakes as the northern portion of the frontal system trekked eastward. Elsewhere, a large high pressure system centered near Bermuda pumped hot and muggy air into the eastern third of the nation. Two dozen daily high temperature records were

tied or broken from Florida northwestward to Kentucky and northward to New England. Showers and thunderstorms were scattered in the warm, humid air across the Southeast.

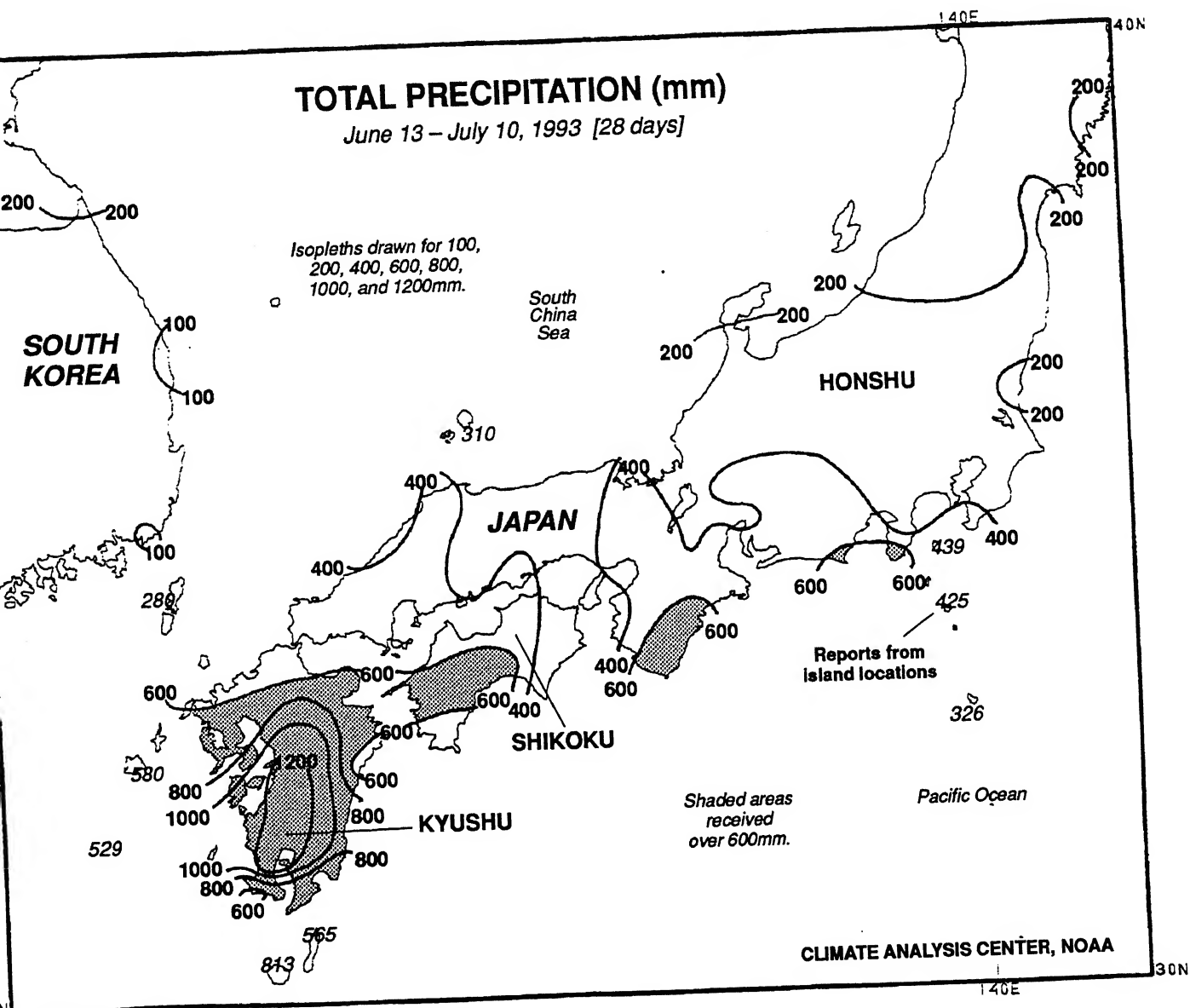
During the last half of the week, the cold front remained draped from the central Plains northeastward to New England. Strong thunderstorms continued to develop along the frontal boundary, aggravating flooding in the east-central Plains and middle Mississippi Valley and bringing heavy rain to the Ohio Valley. Showers and thunderstorms were also widespread from the northern Rockies eastward to the Northeast and across the Southeast and lower Mississippi Valley. The massive Bermuda high pressure system continued to pump hot air into the East. Forty five more daily record highs were established along the Atlantic seaboard from Wednesday to Saturday. In contrast, unseasonably cool air settled across the Northwest and northern Rockies, where three daily low temperature records were broken on Saturday.

According to the River Forecast Centers, the greatest weekly totals (from two to twelve inches) were measured across much of Kansas, Missouri, Iowa, southern and eastern Nebraska, western Illinois, and southern Wisconsin. Scattered totals of two or more inches were observed over the Southeast, the lower and upper Mississippi, middle Missouri, and Ohio Valleys, northern portions of the southern Plains, the northern Rockies, and southern Alaska. Light to moderate amounts were observed in the central Rockies, the southern and central High Plains, eastern Hawaii, and the remainders of the northern Rockies, the northern Plains, southern Alaska, and the eastern half of the nation. Little or no precipitation fell on the Southwest, the Great Basin, the Far West, and the remainders of the southern Plains, Alaska, and Hawaii.

Warmer than normal conditions prevailed across the southern third and eastern third of the contiguous United States. Hot weather covered much of the southern Rockies and the nation east of the Mississippi River, with weekly departures between +3°F and +11°F. In Alaska, abnormally warm weather covered southern and western coastal portions of the state, with weekly departures of up to +5°F at Valdez and Barrow.

In sharp contrast, unseasonably cool weather dominated from the Pacific Northwest eastward to the upper and middle Mississippi Valley, with weekly departures between -6°F and -13°F observed from the interior Northwest eastward to the northern Plains. Cool weather also dominated interior Alaska with temperatures averaging 5°F below normal at Nenana. Normal to slightly below normal temperature covered Hawaii.

GLOBAL CLIMATE HIGHLIGHTS FEATURE



INUNDATING RAINS CONTINUE TO SOAK SOUTHWESTERN JAPAN. Heavy rains and resultant flooding across the central United States, Mexico, northern India, and southeastern China have dominated recent weather-related news, but exceptionally heavy rains have also been observed through southwestern Japan since mid-June. During the 28-day period June 13 – July 10, up to 1280 mm of rain were measured in southwestern Kyushu – an average of over 45 mm per day. The observed totals represent 2.5 to 3.5 times the normal amount in portions of southwestern Honshu near Osaka Bay, across northern and western Shikoku, and through much of Kyushu. Accumulated surpluses over 100 mm were widespread from central Honshu southwestward through the remainder of the Archipelago, with 500–905 mm more than normal rainfall reported in parts of southeastern, central, and west-central Kyushu. Last week, 100–360 mm of rain fell across south-central and southwestern Honshu, central and southern Shikoku, and most of Kyushu, with daily totals reaching 235 mm.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JULY 4 – 10, 1993

Incessant and heavy rains of up to twelve inches continued to inundate much of the east-central Plains and upper and middle Mississippi Valley, aggravating major flooding along most rivers and streams in the region. The depth of the Mississippi at St. Louis, MO was projected to crest near 45 feet by the middle of next week, surpassing the current record of 43.3 feet set in 1973. The Corps of Engineers said almost all levees between Hannibal, MO and St. Louis were breached, although St. Louis was expected to remain dry behind their high flood wall. Numerous levees along the lower Missouri River were also breached, according to press reports. The record flooding has forced more than 30,000 people from their homes and caused 18 deaths since late June. Officials estimate crop and property damage at more than \$2 billion in South Dakota, Minnesota, Wisconsin, Nebraska, Iowa, Illinois, and Missouri. Rising flood waters along the Des Moines and Raccoon Rivers swamped central Iowa, knocking out a water treatment plant serving about 250,000 people in Des Moines as well as seven electric substations, leaving many residents without power or water. As the week ended, several hundred more people in south St. Louis were asked to leave their homes as the River Des Peres continued to rise. Amtrak canceled service between Chicago, IL and Denver, CO and between Chicago and Kansas City, MO, because of the floods, according to press reports.

Meanwhile, the eastern fourth of the nation sizzled as temperatures reached into the upper nineties and above. Many cities along the Atlantic coast, including New York city, Washington, DC, and Philadelphia, PA, surpassed 100°F during the latter part of the week. The combination of heat and humidity produced apparent temperatures exceeding 105°F along the Atlantic coast from South Carolina to New York. Forty eight people (primarily elderly individuals without air conditioning) died from the excessive heat.

The week began with a strong frontal system generating showers and thunderstorms from the northern Rockies eastward to the upper Great Lakes and southeastward to the east-central Plains and middle Mississippi Valley. Severe thunderstorms, accompanied with high wind, large hail, and heavy rain, swept across eastern Kansas and southern Iowa. On Tuesday, torrential rains drenched the lower Missouri Valley while showers and thunderstorms were scattered over the lower Great Lakes as the northern portion of the frontal system trekked eastward. Elsewhere, a large high pressure system centered near Bermuda pumped hot and muggy air into the eastern third of the nation. Two dozen daily high temperature records were

tied or broken from Florida northwestward to Kentucky northward to New England. Showers and thunders were scattered in the warm, humid air across the South.

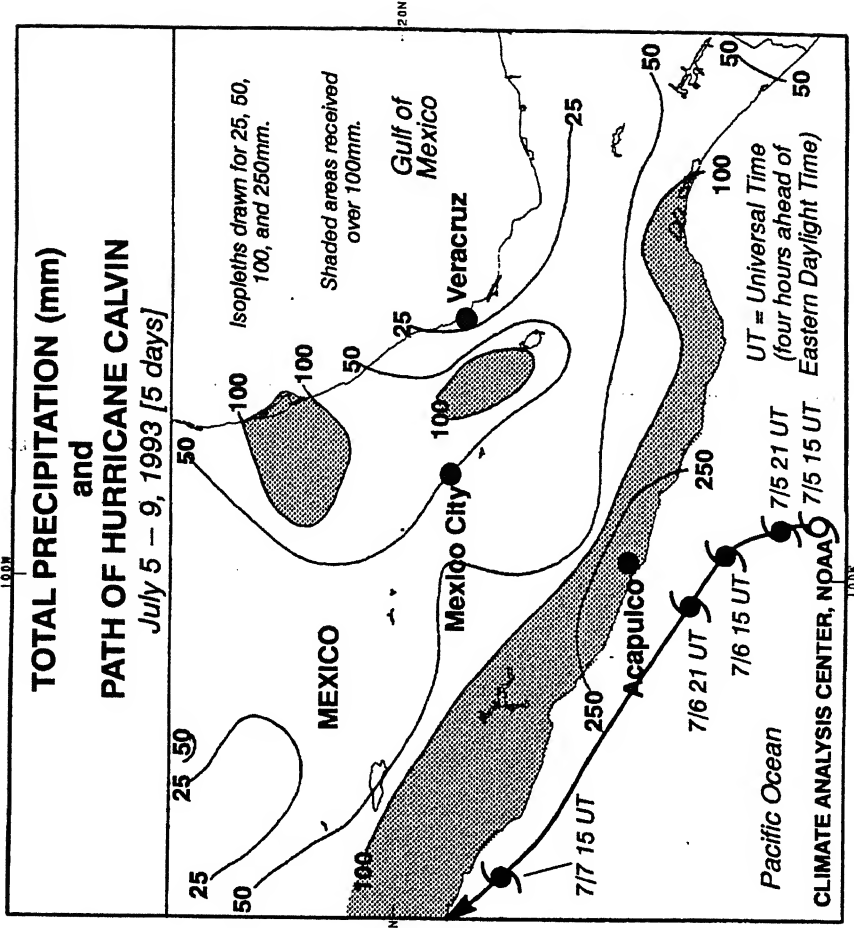
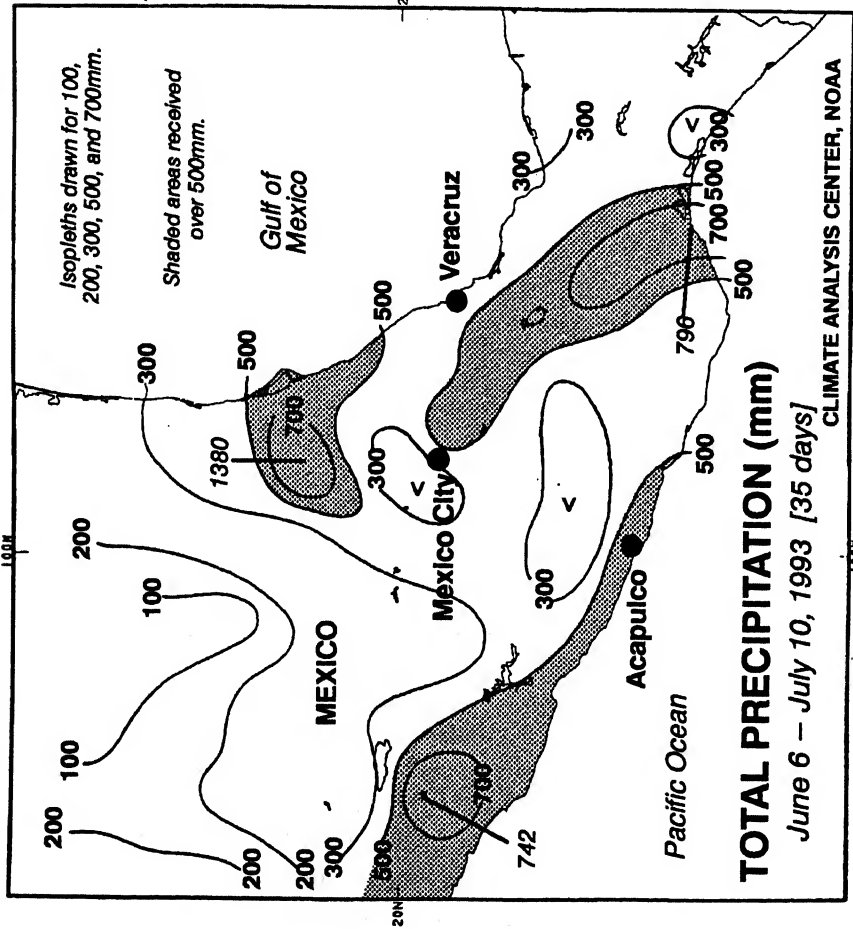
During the last half of the week, the cold remained draped from the central Plains northeastward to New England. Strong thunderstorms continued to develop along the frontal boundary, aggravating flooding in the east-central Plains and middle Mississippi Valley, bringing heavy rain to the Ohio Valley. Showers and thunderstorms were also widespread from the northern Rockies eastward to the Northeast and across the South and lower Mississippi Valley. The massive Bermuda high pressure system continued to pump hot air into the Southeast. Forty five more daily record highs were established along the Atlantic seaboard from Wednesday to Saturday. In contrast, unseasonably cool air settled across the North and northern Rockies, where three daily low temperature records were broken on Saturday.

According to the River Forecast Centers, the greater weekly totals (from two to twelve inches) were measured across much of Kansas, Missouri, Iowa, southern Nebraska, western Illinois, and southern Wisconsin. Scattered totals of two or more inches were observed in the Southeast, the lower and upper Mississippi, the Missouri, and Ohio Valleys, northern portions of the southern Plains, the northern Rockies, and southern Alaska. Light to moderate amounts were observed in the northern Rockies, the southern and central High Plains, the Pacific Northwest, Hawaii, and the remainders of the northern Rockies, northern Plains, southern Alaska, and the eastern half of the nation. Little or no precipitation fell on the Southwest, the Great Basin, the Far West, and the remainder of the southern Plains, Alaska, and Hawaii.

Warmer

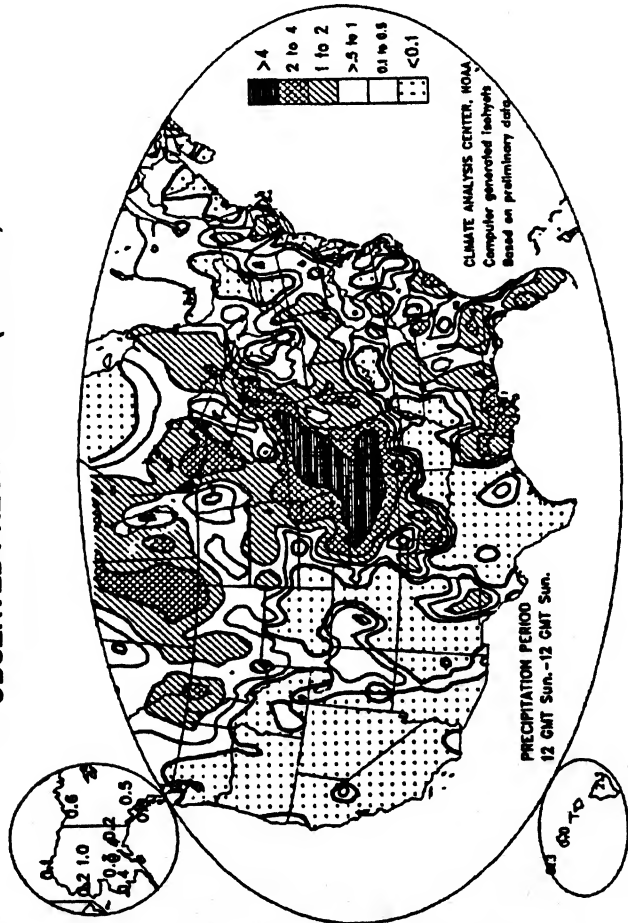
S
S

NORTH AMERICAN CLIMATE HIGHLIGHTS FEATURE

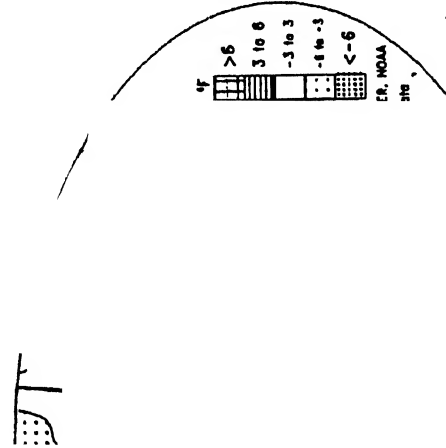


HURRICANE CALVIN BATTERS THE WESTERN MEXICO COASTLINE; AGGRAVATES FIVE WEEKS OF EXCESSIVELY WET WEATHER. Hurricane Calvin paralleled the Mexican coastline for over 24 hours before briefly moving inland around 18 UT (2 PM EDT) on July 7 with winds of 165 kph and peak gusts approaching 205 kph. Calvin continued northwestward, slowly weakening, after making landfall, but most of the damage wrought by the Hurricane occurred from 36 hours prior to landfall to its quick trek across the western tip of Jalisco State. Rainfall totals for the 5-day period ending July 9 topped 250 mm along parts of the southwestern Mexico coastline, with daily amounts reaching 225 mm. According to press reports, the storm took 37 lives and left 42,000 homeless. Nearly 1,000 dwellings were destroyed near Acapulco, where some of last week's heaviest rains fell. The system served to exacerbate generally wet conditions which have affected central and south-central Mexico during the last five weeks. Up to 1380 mm fell on parts of central Mexico during this period, and totals over 500 mm were measured in several areas.

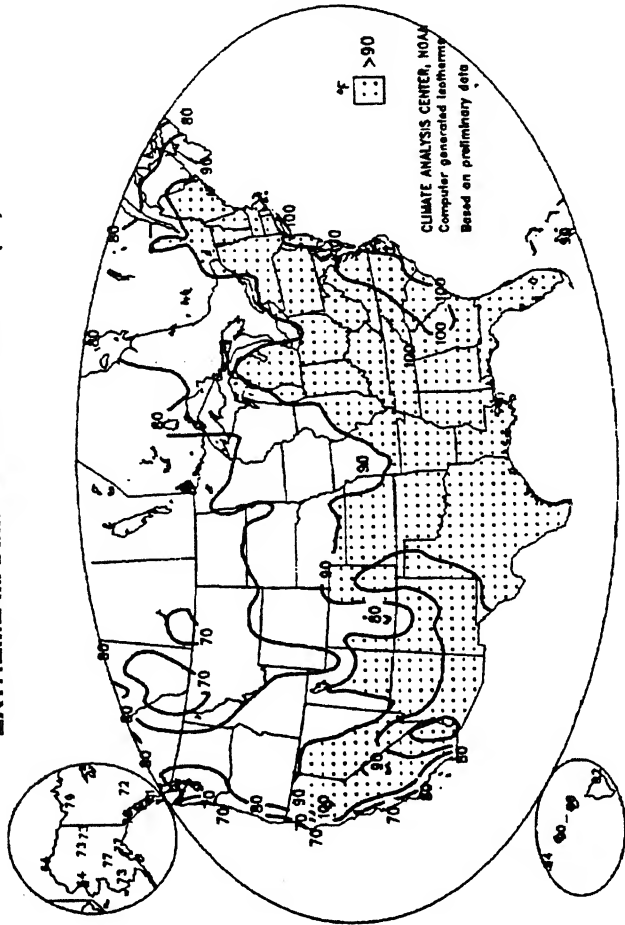
OBSERVED PRECIPITATION (INCHES)



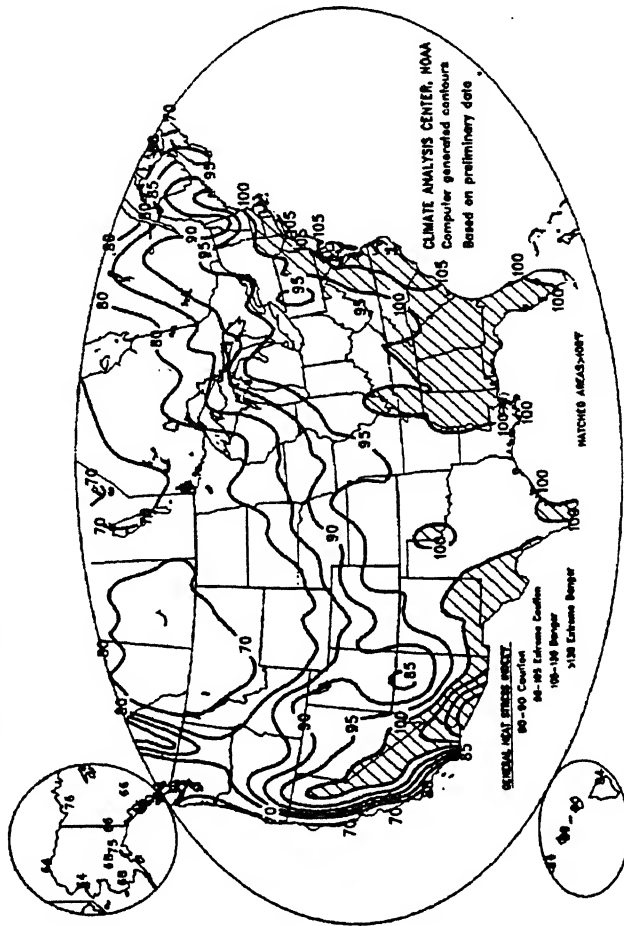
DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)



EXTREME MAXIMUM TEMPERATURE (°F)

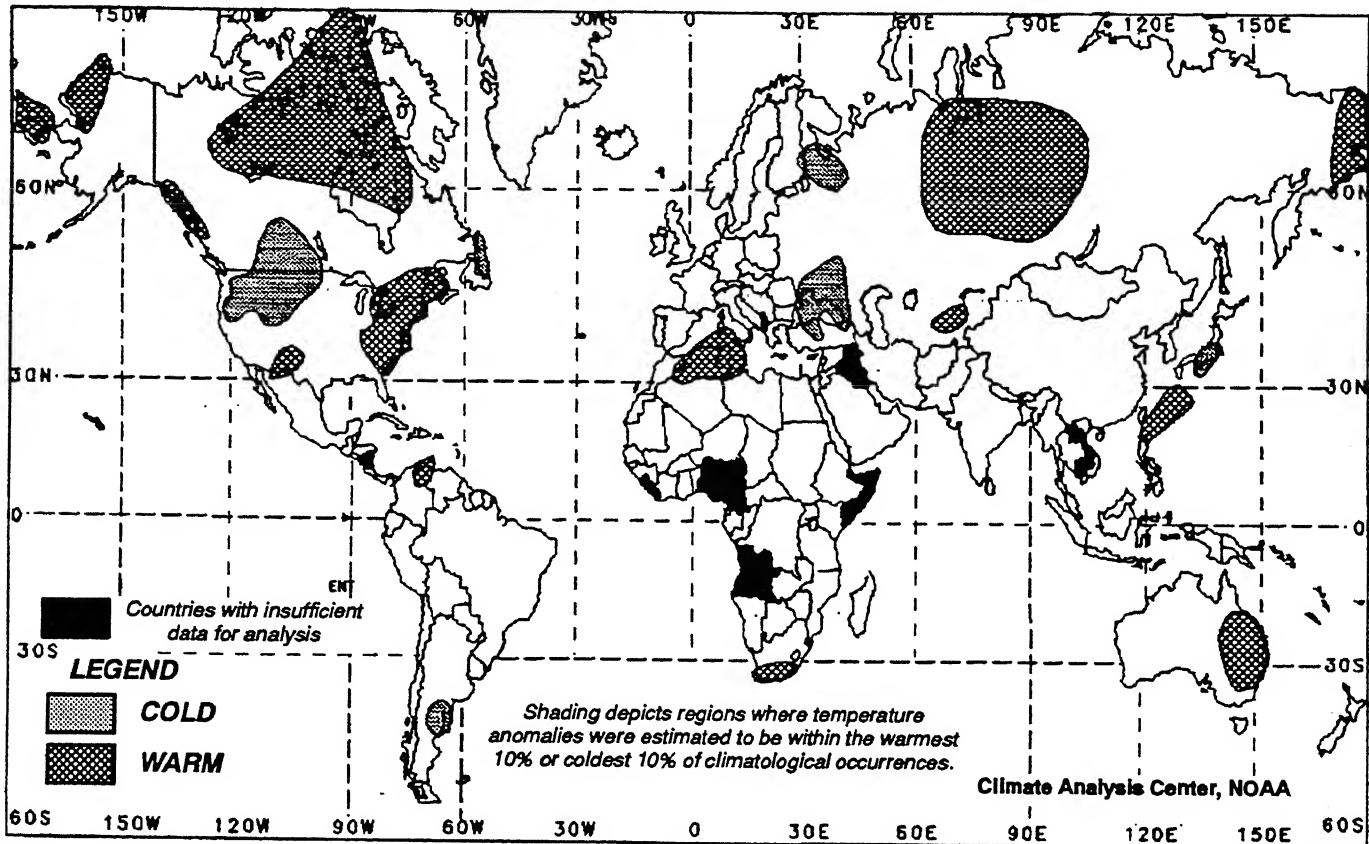


EXTREME APPARENT TEMPERATURE (°F)



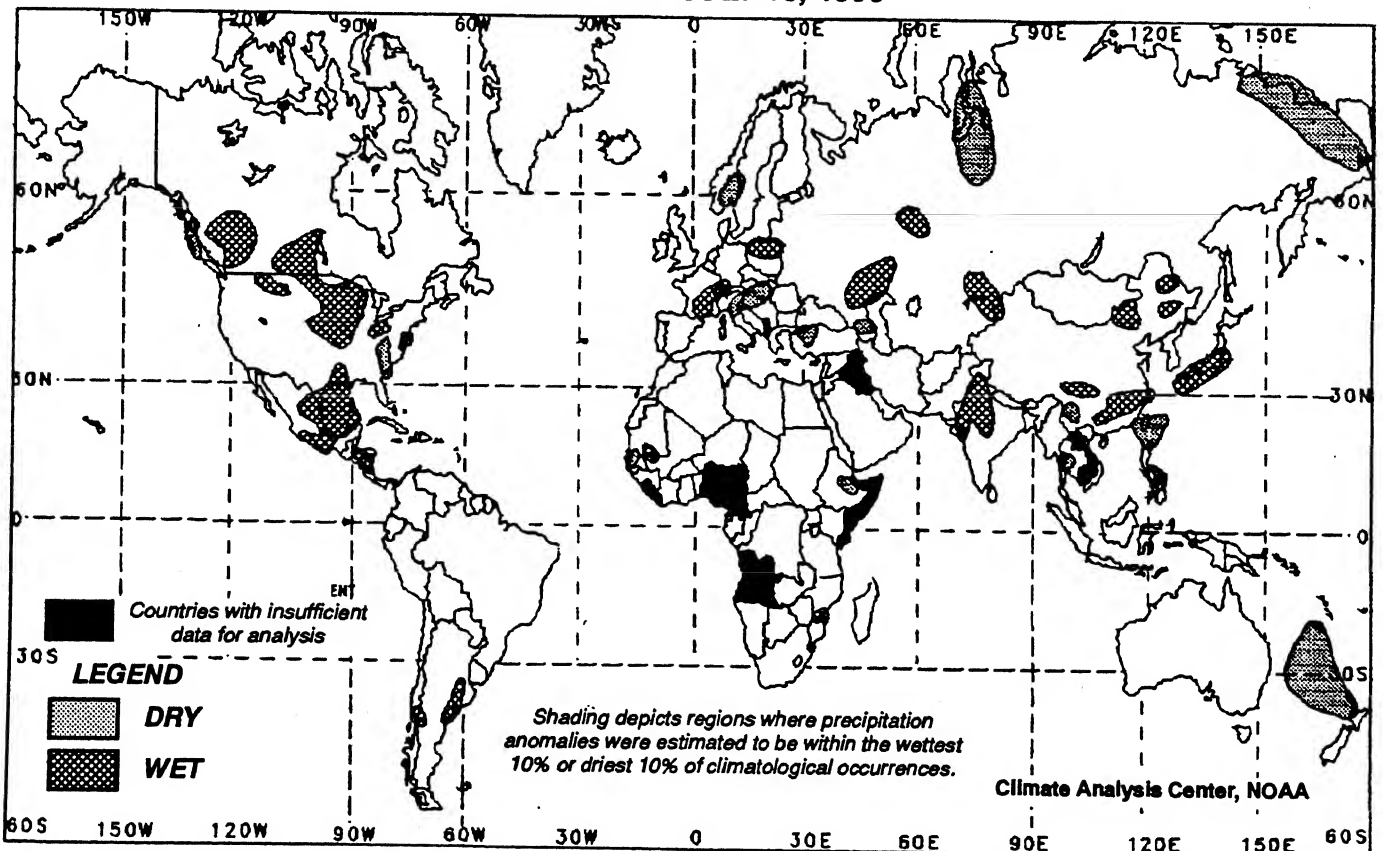
TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

JUNE 27 – JULY 10, 1993



FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

JUNE 13 – JULY 10, 1993



UNITED STATES MONTHLY CLIMATE SUMMARY

JUNE 1993

June was dominated by a stagnant pattern that brought cool, dry conditions to the Northwest and Rockies, hot and humid weather to the Southeast, and repeated rounds of heavy thunderstorms to the Mississippi Valley. The jet stream dove southward into the central Intermountain West and Rockies, then northward through the upper Midwest, delivering hot and humid air into the Southeast. A convergence zone between the cool, dry air in the Northwest and the hot, moist flow from the Gulf produced a continuing series of thunderstorms and torrential rains across the Midwest and prevented cooler air from bringing relief to the Southeast. Excessive precipitation throughout the Mississippi River drainage basin, combined with a near to above normal long-term moisture supply, produced saturated soils and near-record to record flooding unparalleled since the spring floods of 1973 and 1965. New record high crests were established at numerous locations along the Mississippi River. Flooding and high river levels curtailed commercial and recreational navigation along extensive sections of the Mississippi and Missouri Rivers because of the dangers posed by fast-flowing waters, floating debris, and weakened levees. In sharp contrast, rainfall deficits in the Southeast and along the Atlantic Coast continued to grow during June as several locations in the region observed record low June rainfall totals (under 0.25 inch in a few areas). Temperatures averaging 2°F to 4°F above normal exacerbated the dryness and increased the risk of wildfires throughout the Southeast.

June opened with a series of cool high-pressure systems crossing the northern Plains, Great Lakes, and Northeast, establishing a few new June low temperature records (page 12). Unusually cool conditions also prevailed across the central Sierra Nevadas and southern Cascades, where up to a foot of snow blanketed higher elevations. In sharp contrast, very warm air covered the West Coast, southern Plains, and Southeast. In Texas, Del Rio measured a daily record high of 110°F. Heavy showers and thunderstorms erupted along the wavering boundary separating the two contrasting air masses, especially in the middle Mississippi Valley and the Corn Belt. Exceptionally mild conditions also prevailed across Alaska, where the mercury climbed to 86°F at Fairbanks.

Slow-moving storm systems again generated heavy rain and severe weather across the Great Plains and the Mississippi and Ohio Valleys during the second week of the month. Thunderstorm wind gusts of 60 to 100 mph uprooted trees, tore down power lines, and caused considerable property damage at scattered locations from Texas northeastward to New York. The southern Atlantic Coast states sweltered in hot and humid air as a half dozen daily high temperature records were established. In contrast, unseasonably cold weather settled over the Intermountain West, and moderate to heavy snow fell on the higher elevations of the northern Cascades and central Rockies.

The third week of June featured powerful storms across the nation's midsection. Moist, unstable air streamed northward ahead of a strong low-pressure system, fueling violent thunderstorms and heavy rains from the middle Mississippi Valley to the upper Great Lakes. Up to eight inches of rain inundated west-central Wisconsin, forcing the Black River out of its banks and damaging a dam near Hatfield, WI. Meanwhile, flash flooding resulted from brief heavy rains across southern Minnesota. Farther south, scattered severe thunderstorms generated golfball-sized hail across parts of Missouri, Iowa, and Nebraska. In addition, heavy rain, hail, and high winds knocked out power to about 60,000 homes in southern Ohio.

During the last full week of the month, Tropical Storm Arlene and its remnants barged southern and eastern Texas, southern Arkansas, and most of Louisiana with torrential rains. Daily rainfall totals approaching 15 inches drenched Henderson, TX. Farther north, strong to severe thunderstorms soaked the already-saturated upper and middle Mississippi Valley, northern and central Great Plains, Great Lakes, and Midwest. According to press reports, a 15-minute cloudburst dumped more than 6.5

inches of rain on New London in southeastern Iowa. Meanwhile, wintry weather was observed farther west, with light to moderate snowfall reported above elevations of 6000 feet through the Cascades and in Glacier National Park, MT. Several record daily lows dotted the northwestern quadrant of the country. In sharp contrast, a few daily record highs were established in California as the mercury soared past the century mark. June closed with continuing heavy rains drenching the north-central states.

According to the River Forecast Centers, heavy precipitation (over eight inches) covered the eastern Corn Belt and the western Gulf Coast, with four inches or more widespread across the central and north-eastern states. At least twice the normal precipitation was observed across the north-central states and the southern Plains (page 8). Based on preliminary calculations from the National Climatic Data Center (NCDC), six of the nine regions experienced above median precipitation, with the West and the East North Central reporting the 4th and 7th wettest June, respectively, since records began in 1895 (page 9). Of the 48 contiguous states, 25 observed above median precipitation, with California and Wisconsin reporting the wettest and second wettest June on record, respectively. Several locations across the upper Midwest established new June maximum precipitation records (page 12). Nationally, June 1993 was the 12th wettest such month. For the first six months of 1993, the East North Central, Southwest, and West regions experienced the 4th, 7th, and 10th wettest such period, respectively, since 1895 while the nation as a whole reported the 4th wettest first half of a year on record, surpassed only by 1905, 1957, and 1975. Not surprisingly, the April – June period was the wettest on record for the regions comprising the Upper Mississippi Valley (see page 13). Well above median moisture was also observed throughout the Primary Corn and Soybean Belt for the March – June period, despite relatively dry weather in southeastern parts of the region.

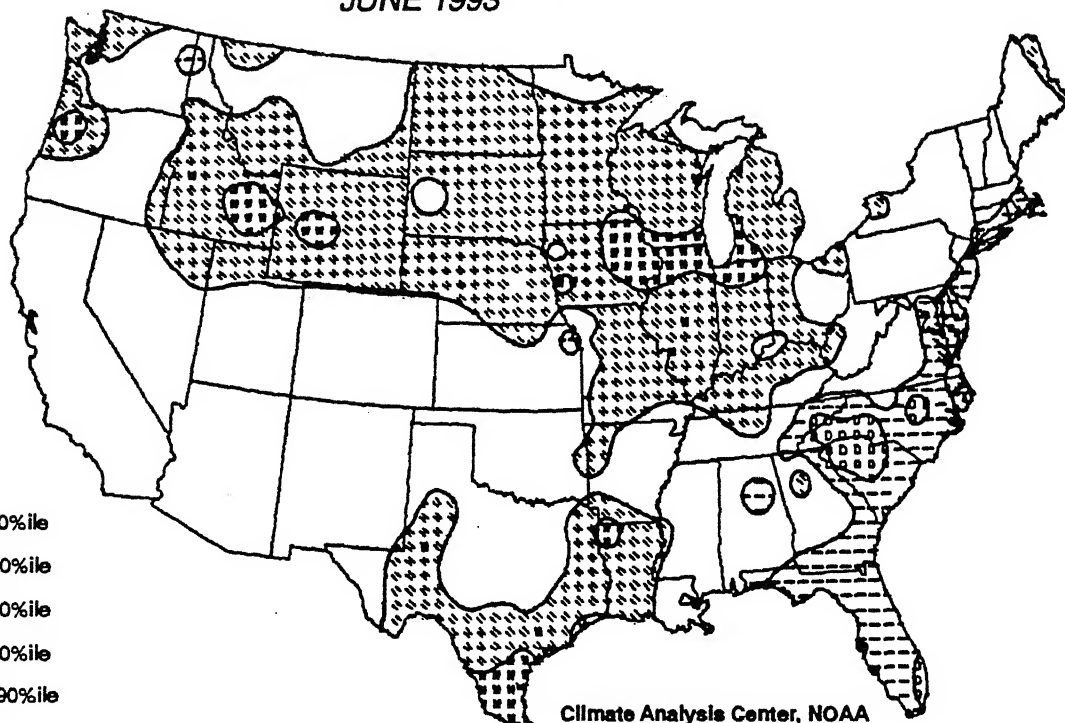
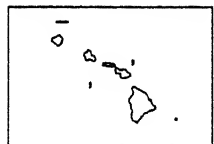
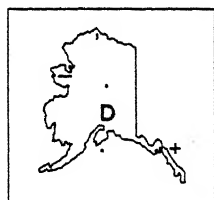
Below normal precipitation prevailed in the southern Rockies, the Southeast, and much of the Atlantic Coast. Only portions of the Southeast, southern Rockies, and Southwest received less than one inch of rain during June (page 8). Most of Alaska and Hawaii also reported below normal precipitation during the month. Only three of the NCDC regions endured submedian precipitation during June 1993, with the Southeast ranking 7th driest since 1895 (page 9). Delaware and South Carolina both experienced the driest June on record while North Carolina observed the second driest such month in 99 years.

Unusually cool weather dominated most of the western, central, and northern United States, with monthly mean temperatures averaging 4°F to 6°F below normal across the Intermountain West and the northern half of the Great Plains (page 10). According to NCDC, five of the nine regions reported submedian temperatures, with the West North Central experiencing the 11th coolest June since 1895 (page 11). Of the 48 contiguous states, exactly half observed below median monthly mean temperatures, with Utah and Nevada ranking 5th and 7th, respectively. Across the country as a whole, June 1993 ranked as the 24th coolest on record. A few June minimum temperature records were established in the central states (page 12).

In contrast, abnormally high temperatures prevailed along the California Coast and across the eastern and southern parts of the nation, with monthly mean temperatures averaging 2°F to 5°F above normal in the Southeast and along the California coast (page 10). Above normal temperatures also prevailed in Hawaii and Alaska, with monthly departures of +3°F to +6°F common across the interior of the latter state. Four of the NCDC regions reported above median temperatures, but only the Southeast was in the upper third of the 99-year distribution (page 11). Readings were above long-term median values in 24 of the 48 contiguous states, with Rhode Island and New Jersey ranking 15th and 17th warmest, respectively.

PRECIPITATION PERCENTILES

JUNE 1993



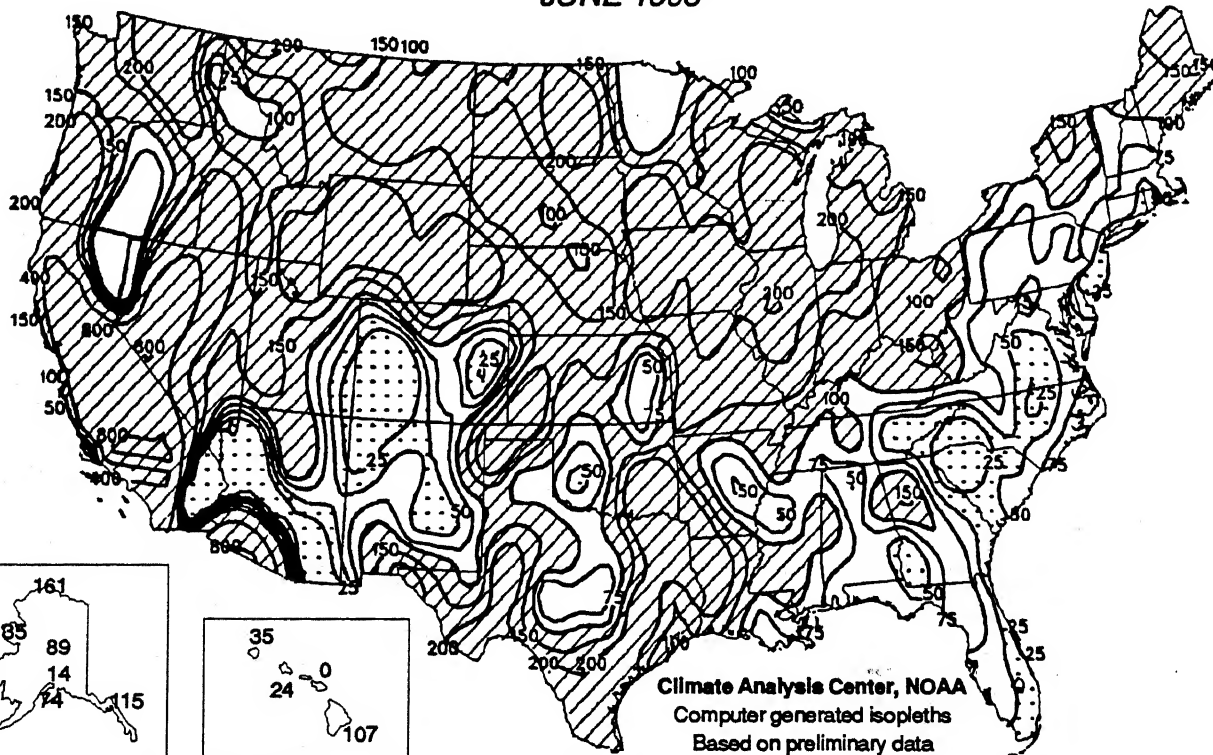
Climate Analysis Center, NOAA

- D less than 10%ile
- 10%ile to 30%ile
- . 30%ile to 70%ile
- + 70%ile to 90%ile
- W more than 90%ile

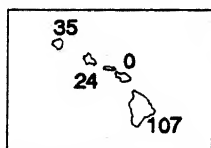
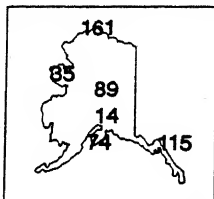
JUNE 1993 PRECIPITATION PERCENTILES, as computed by the Climate Analysis Center. A wet month ($>70\%$ ile) was observed across most of the central states and the Pacific Northwest. Totals were among the wettest 10% of the historical distribution in parts of the northern Intermountain West, the middle Mississippi Valley, and southern Texas. Climatologically significant dryness ($<30\%$ ile) prevailed in the Southeast and the mid-Atlantic, with totals among the driest 10% of the distribution in the Carolinas.

PERCENT OF NORMAL PRECIPITATION

JUNE 1993

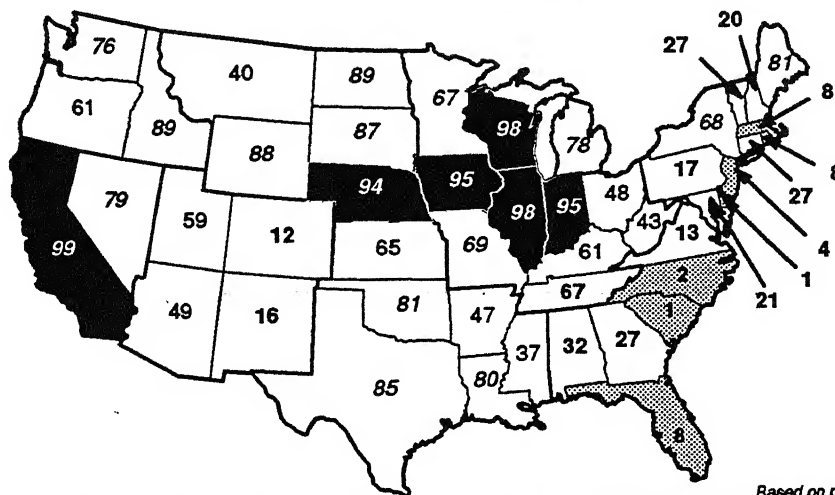


Climate Analysis Center, NOAA
Computer generated isopleths
Based on preliminary data



JUNE 1993 PERCENT OF NORMAL PRECIPITATION. Hatched areas received above normal precipitation, and dotted areas reported under half of normal. Abnormally wet weather dominated the West, the northern and central Rockies, the Great Plains, the Midwest, and northern New England during June 1993 while unusually low totals were measured in much of the southern Rockies, the Southeast, the mid-Atlantic, and southern New England.

HISTORICAL PRECIPITATION RANKINGS BY STATE JUNE 1993



LEGEND

Among the ten driest

Among the ten wettest

1 – 33: DRY

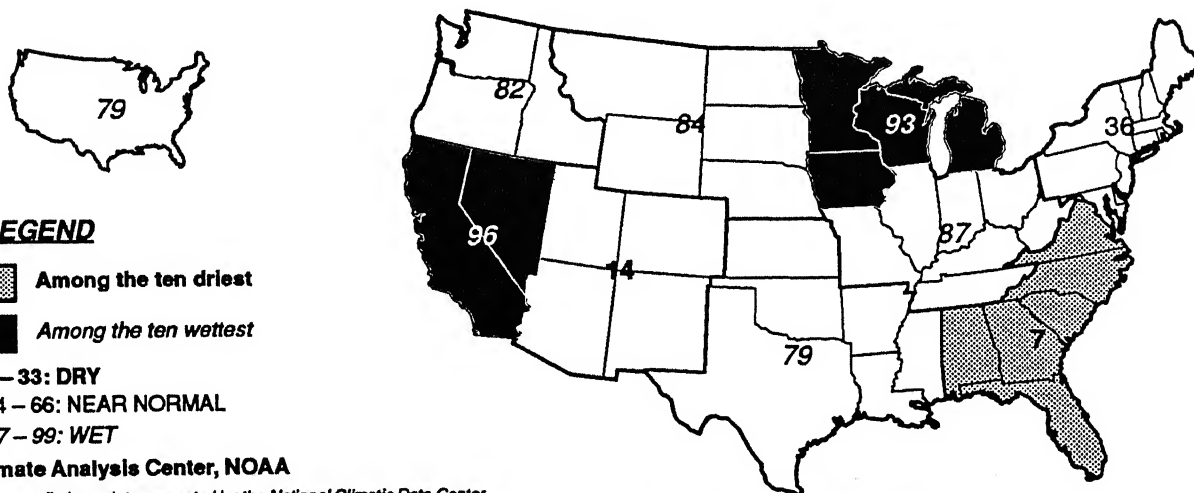
34 – 66: NEAR NORMAL

67 – 99: WET

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center
This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

HISTORICAL PRECIPITATION RANKINGS BY REGION AND NATION JUNE 1993



LEGEND

Among the ten driest

Among the ten wettest

1 – 33: DRY

34 – 66: NEAR NORMAL

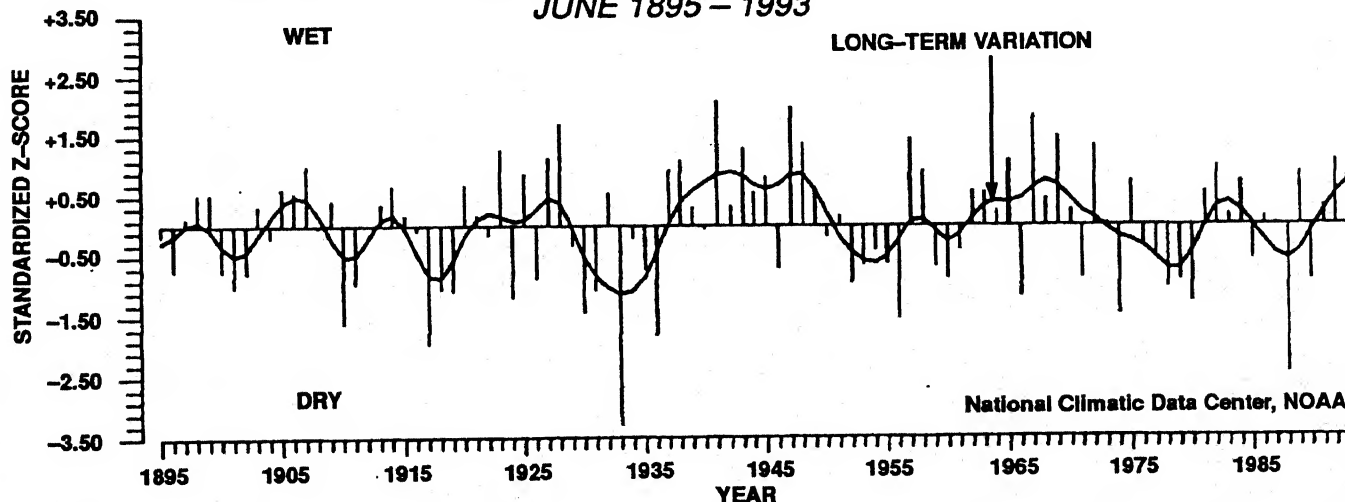
67 – 99: WET

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

U. S. NATIONAL NORMALIZED PRECIPITATION INDEX JUNE 1895 – 1993

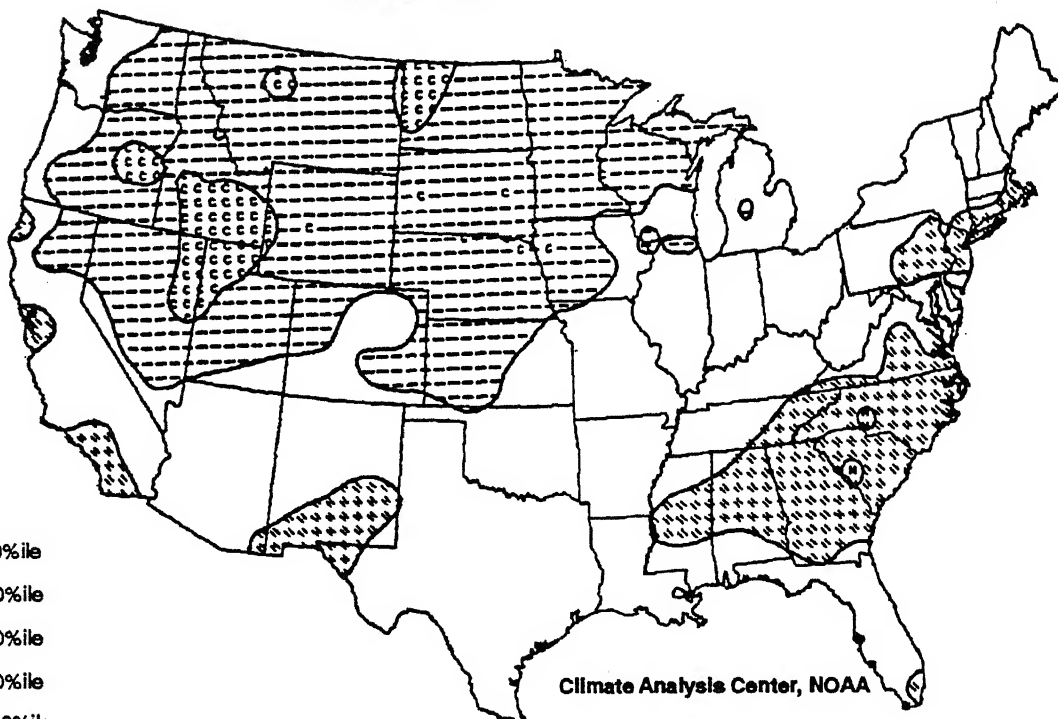
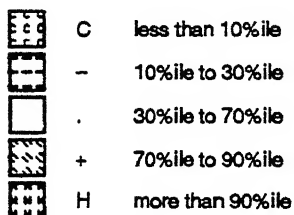
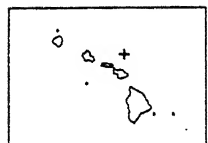


National Climatic Data Center, NOAA

NATIONAL MEAN JUNE 1993 PRECIPITATION INDEX, as computed by the National Climatic Data Center. June 1993 ranked as the 21st wettest on record. This index takes local normals into account so that regions with large precipitation amounts do not dominate the index value.

TEMPERATURE PERCENTILES

JUNE 1993

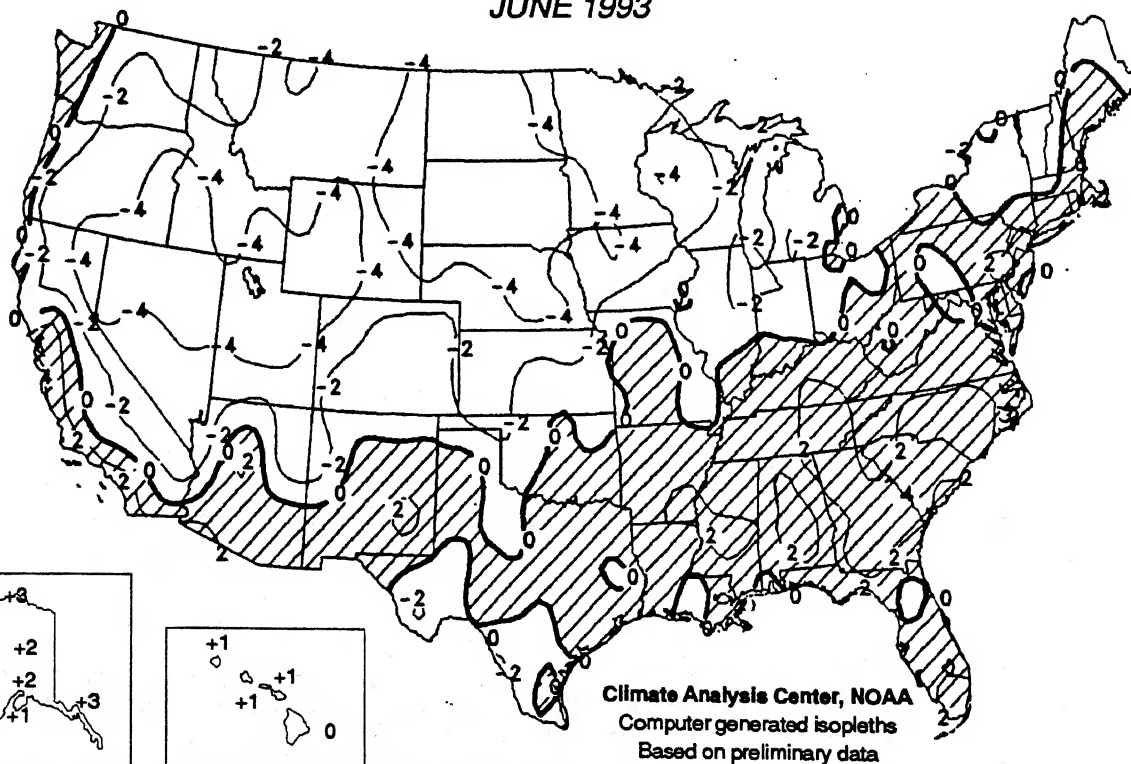


Climate Analysis Center, NOAA

JUNE 1993 TEMPERATURE PERCENTILES, as computed by the Climate Analysis Center. Unusually cool weather (<30%ile) dominated the western and north-central states, with monthly mean temperatures among the coolest 10% of the 1961-1990 distribution in parts the Intermountain West. In contrast, abnormally warm weather (>70%ile) prevailed in the desert Southwest, the Southeast, and the mid-Atlantic.

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

JUNE 1993

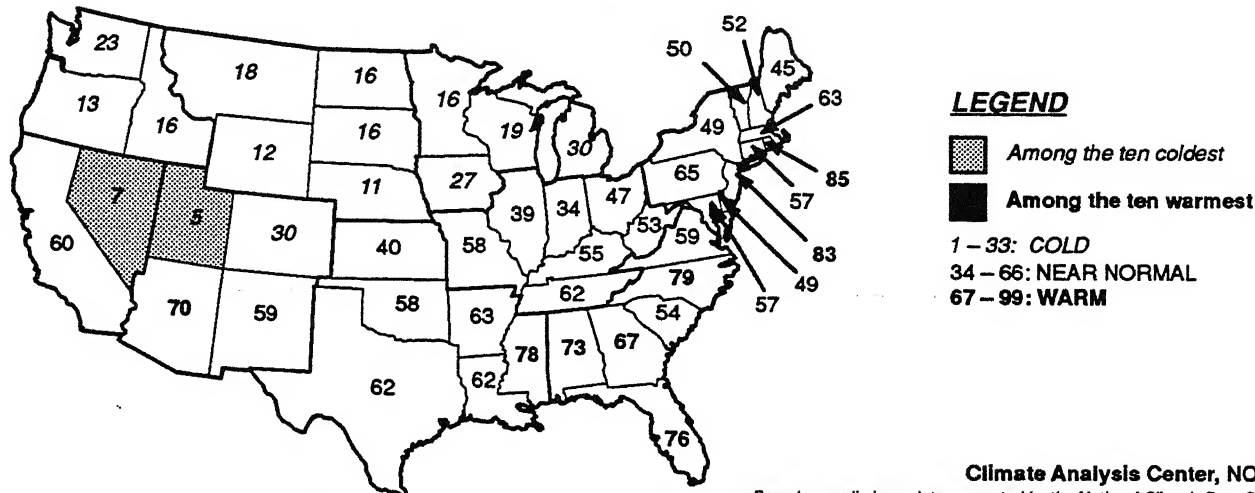


Climate Analysis Center, NOAA
Computer generated isopleths
Based on preliminary data

JUNE 1993 DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F). Shaded areas experienced above normal temperatures. Warm weather covered much of the southern and eastern states, with temperatures averaging up to 4°F above normal in the Southeast. Subnormal temperatures, however, prevailed across most of the West and the northern Plains, with monthly means approaching 6°F below normal in the northern Great Basin.

HISTORICAL TEMPERATURE RANKINGS BY STATE

JUNE 1993

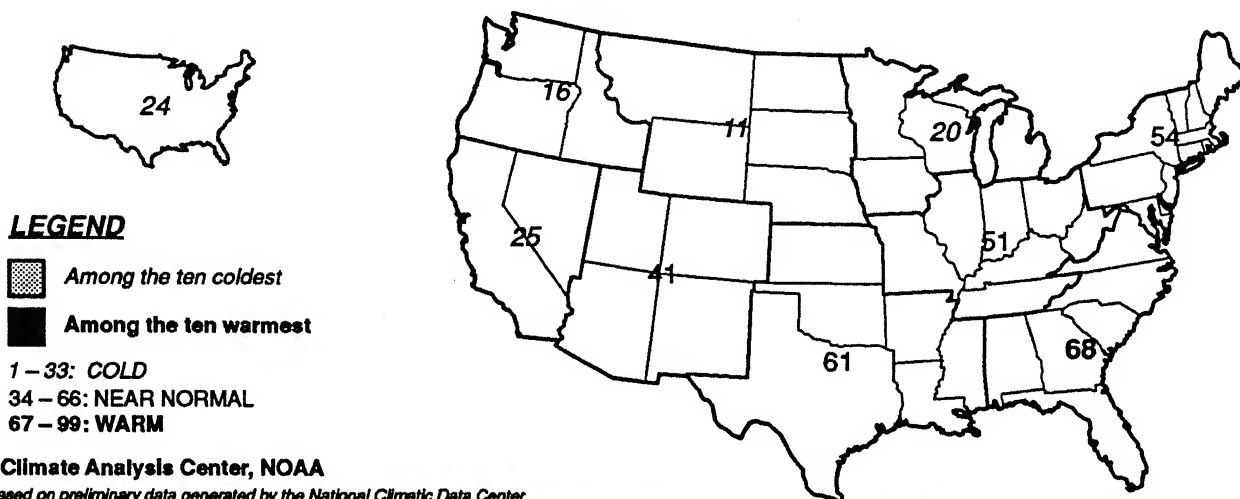


Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center
This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

HISTORICAL TEMPERATURE RANKINGS BY REGION AND NATION

JUNE 1993



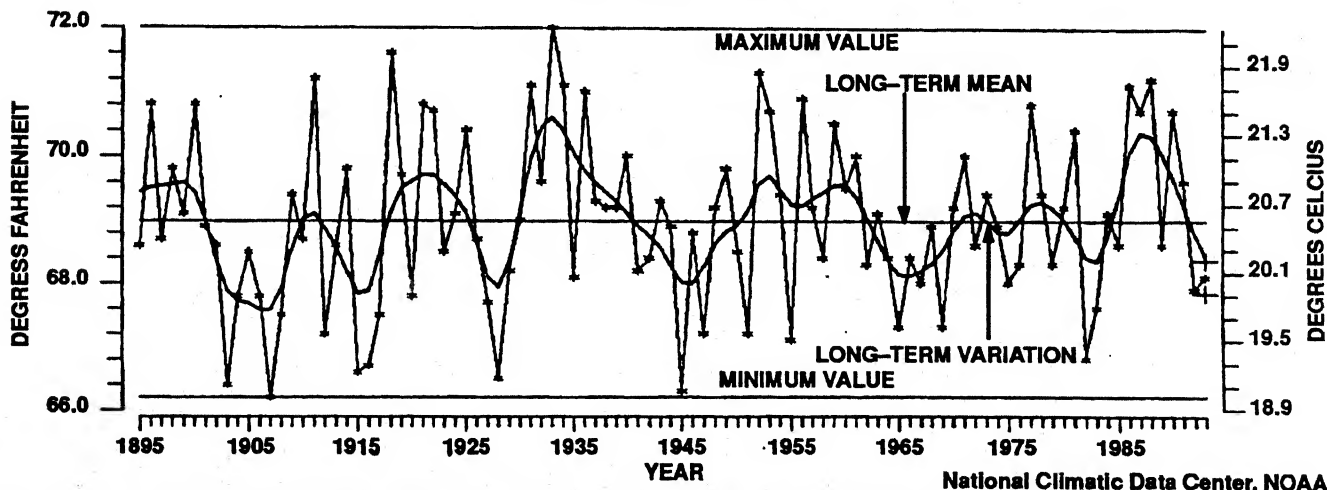
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

U. S. NATIONAL TEMPERATURE

JUNE 1895 - 1993



National Climatic Data Center, NOAA

NATIONALLY AVERAGED JUNE 1993 TEMPERATURES, as computed by the National Climatic Data Center. Below normal temperatures across the western and north-central states dominated the nationally averaged temperature, yielding the 24th coolest June on record.

TABLE 1. RECORD JUNE PRECIPITATION

<u>STATION</u>	<u>TOTAL (IN)</u>	<u>NORMAL (IN)</u>	<u>PCT. OF NORMAL</u>	<u>RECORD TYPE</u>	<u>RECORDS BEGAN</u>
MOLINE, IL	13.21	4.27	309.4	HIGHEST	1927
ROCKFORD, IL	11.85	4.52	262.2	HIGHEST	1950
SOUTH BEND, IN	10.86	4.11	264.2	HIGHEST	1939
WATERLOO, IA	10.11	4.47	226.2	HIGHEST	1949
CHICAGO/O'HARE, IL	9.96	3.78	263.5	HIGHEST	1958
FRESNO, CA	1.61	0.08	2012.5	HIGHEST	1940
LOS ANGELES, CA	0.74	0.03	2466.7	HIGHEST	1936
RALEIGH-DURHAM, NC	0.33	3.68	9.0	LOWEST	1945
GREENVILLE-SPARTANBURG, SC	0.17	4.77	3.6	LOWEST	1951
CHARLOTTE, NC	0.15	3.39	4.4	LOWEST	1940

NOTE: Trace precipitation is considered ZERO precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.
 ***** - Percent of normal not calculable.

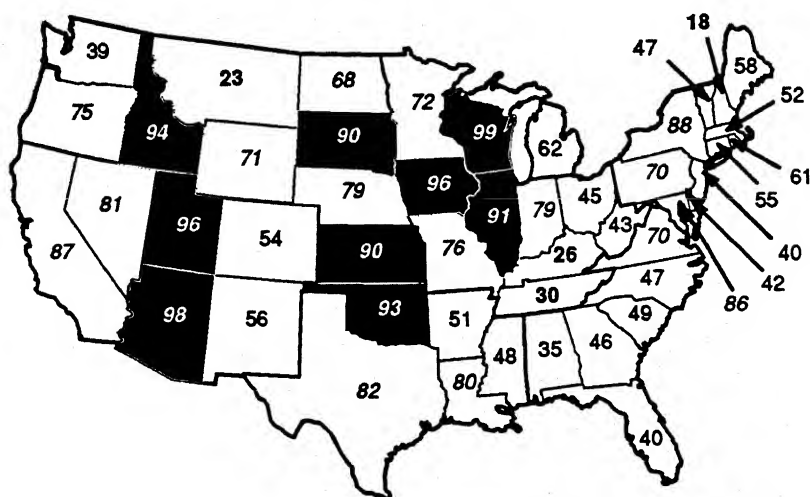
TABLE 2. RECORD JUNE AVERAGE TEMPERATURES

<u>STATION</u>	<u>DEPARTURE (°F)</u>	<u>AVERAGE (°F)</u>	<u>NORMAL (°F)</u>	<u>RECORD TYPE</u>	<u>RECORDS BEGAN</u>
NEWARK, NJ	+3.4	75.9	72.5	HIGHEST	1944
VICTORIA, TX	-1.1	79.5	80.6	LOWEST	1961
POCATELLO, ID	-5.9	56.7	62.6	LOWEST	1947

TABLE 3. RECORD JUNE EXTREME TEMPERATURES

<u>STATION</u>	<u>EXTREME (°F)</u>	<u>DATE OCCURRED</u>	<u>RECORD TYPE</u>	<u>RECORDS BEGAN</u>
ROCKFORD, IL	37	JUNE 1	LOWEST	1950
FORT WAYNE, IN	38	JUNE 1	LOWEST	1939
MOLINE, IL	39	JUNE 1	LOWEST	1927
PEORIA, IL	39	JUNE 1	LOWEST	1945
COLUMBIA, MO	40	JUNE 5	LOWEST	1969
TOPEKA, KS	43	JUNE 5	LOWEST	1946
LAS VEGAS, NV	48	JUNE 6	LOWEST	1949

SIX-MONTH HISTORICAL PRECIPITATION RANKINGS BY STATE



LEGEND

Among the ten driest

Among the ten wettest

1 – 33: DRY

34 – 66: NEAR NORMAL

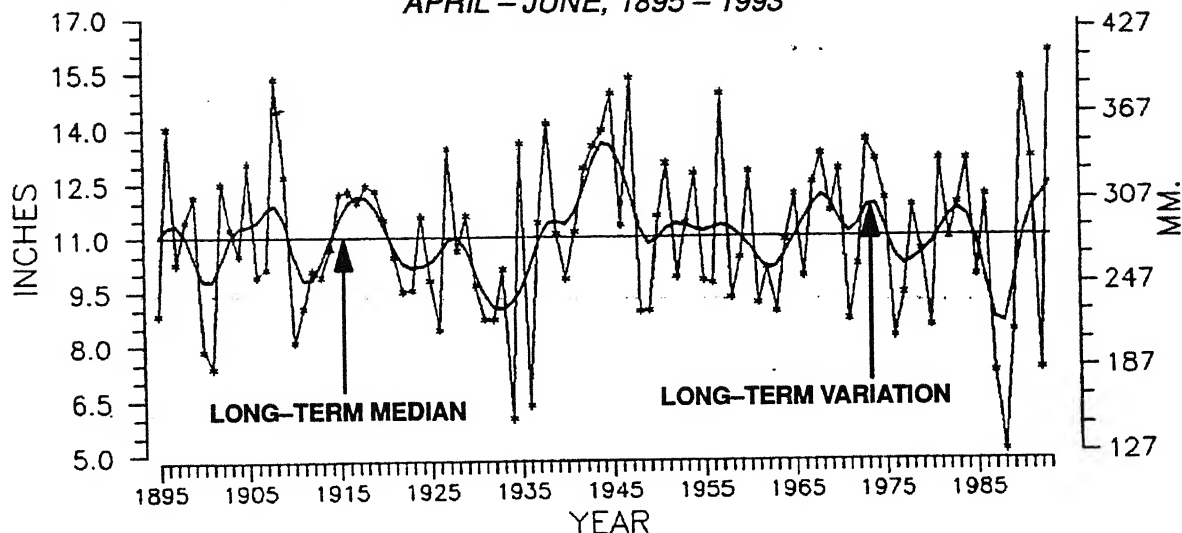
67-99: WET

Climate Analysis Center, NOAA

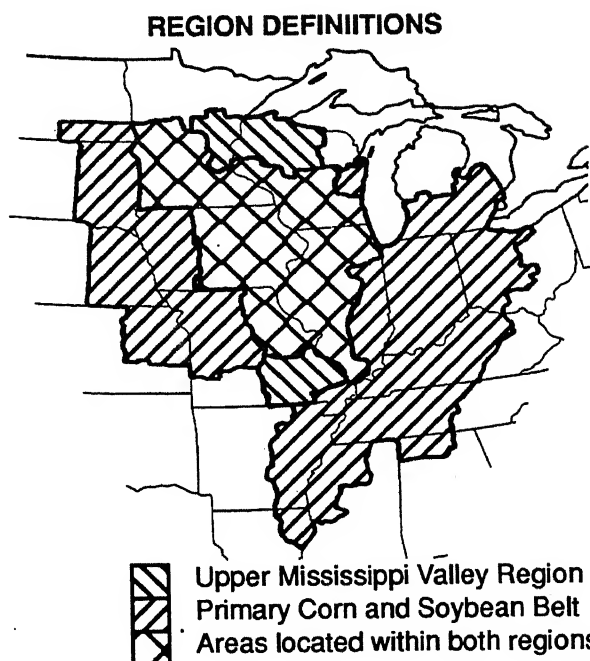
Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

UPPER MISSISSIPPI VALLEY PRECIPITATION **APRIL – JUNE, 1895 – 1993**

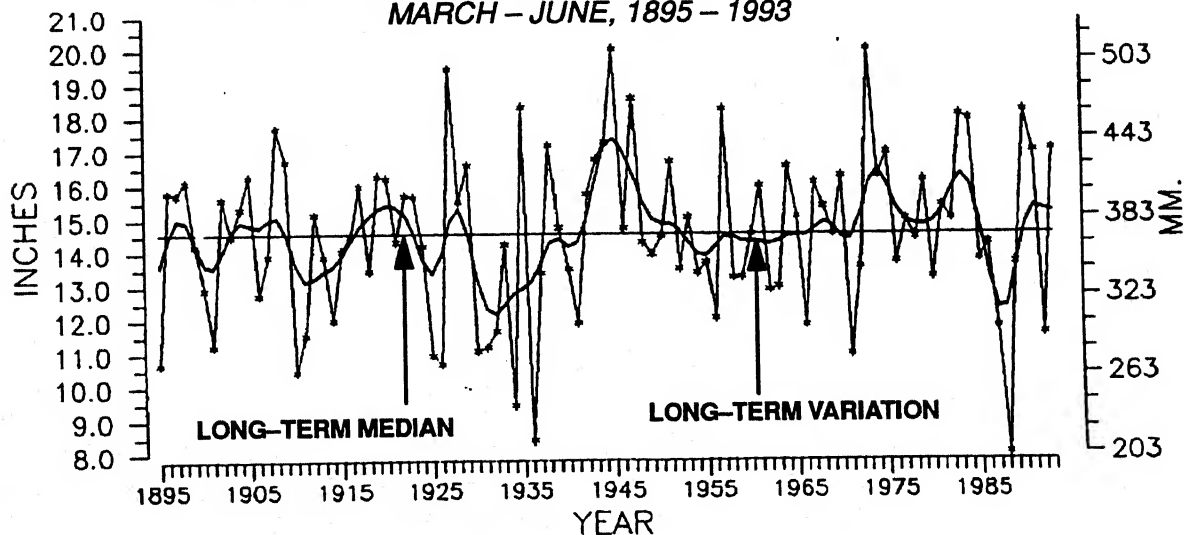


APRIL – JUNE PRECIPITATION AVERAGED ACROSS THE UPPER MISSISSIPPI VALLEY, 1895 – 1993 (top), and MARCH – JUNE PRECIPITATION AVERAGED ACROSS THE PRIMARY CORN AND SOYBEAN BELT, 1895 – 1993 (bottom). The region definitions are depicted in the figure to the right. *Not surprisingly, April – June 1993 was the wettest such period on record across the Upper Mississippi Valley and was approximately 130 mm (over 5 inches) above normal. The larger Primary Corn and Soybean Belt endured about 60 mm more precipitation than normal as a whole during the last four months despite relatively dry conditions across southeastern sections of the region.*



NATIONAL CLIMATIC DATA CENTER, NOAA

PRIMARY CORN AND SOYBEAN BELT PRECIPITATION **MARCH – JUNE, 1895 – 1993**



APPARENT TEMPERATURE

Apparent temperature is a measure of human discomfort caused by combined heat and high humidity. It was developed by Dr. R. G. Steadman (1979) and is based on human physiology and textile (clothing) science. Apparent temperature is designed so that apparent temperature exceeds the actual air temperature when humidity is relatively high. The apparent temperature then increases with increased physiological heat stress and discomfort associated with higher than comfortable humidities. Apparent temperature is less than the actual air temperature when humidity is relatively low and apparent temperature indicates the reduced stress and discomfort associated with the higher rate of cooling of the skin.

Apparent temperatures greater than 80°F (27°C) are likely to cause some discomfort. Values in excess of 105°F are considered dangerous and even life-threatening, with heat exhaustion or heat stroke possible if the exposure or physical activity is high. The degree of discomfort varies with age, health, and body characteristics.

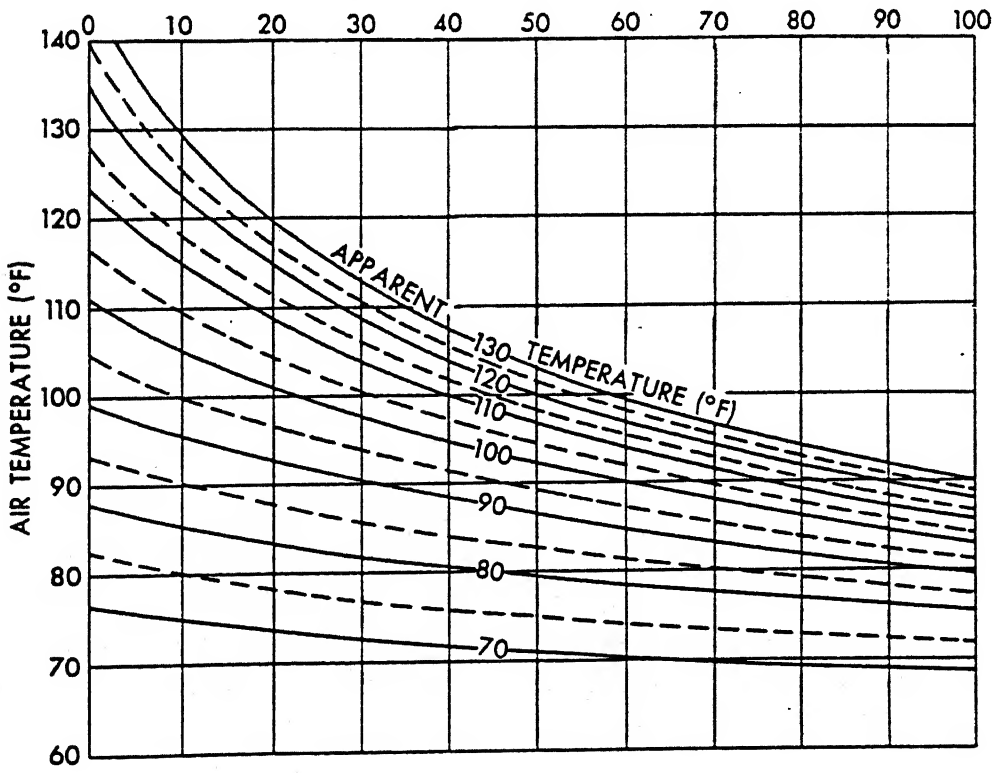
The apparent temperature as used here does not consider the effects of air movement (wind speed) or exposure to sunshine on the degree of discomfort or stress.

Reference: Steadman, R. G., 1979: The Assessment of Heat Stress, Part I: A Temperature-Humidity Index Based on Human Physiology and Clothing Science, (*Journal of Applied Meteorology*, Vol. 18, pp. 861-873.)

GENERAL HEAT STRESS INDEX		
danger Category	Apparent Temperature (°F)	Heat Syndrome
IV. EXTREME DANGER	GREATER THAN 130°	HEATSTROKE OR SUNSTROKE IMMINENT.
III. DANGER	105° - 130°	SUNSTROKE, HEAT CRAMPS, OR HEAT EXHAUSTION LIKELY. HEAT STROKE POSSIBLE WITH PROLONGED EXPOSURE AND PHYSICAL ACTIVITY.
II. EXTREME CAUTION	90° - 105°	SUNSTROKE, HEAT CRAMPS, AND HEAT EXHAUSTION POSSIBLE WITH PROLONGED EXPOSURE AND PHYSICAL ACTIVITY.
I. CAUTION	80° - 90°	FATIGUE POSSIBLE WITH PROLONGED EXPOSURE AND PHYSICAL ACTIVITY.

NOTE: DEGREE OF HEAT STRESS MAY VARY WITH AGE, HEALTH, AND BODY CHARACTERISTICS.

RH % ↓



Relationship of air temperature and relative humidity to apparent temperature (after Steadman, 1979). This graph can be used for various combinations of air temperature and relative humidity. (Provided by National Climatic Data Center, NESDIS, NOAA.)

